

### ABSTRACT OF THE DISCLOSURE

An optical waveguide structure is formed by embedding a core material within a medium of lower refractive index, i.e. the cladding. The optical index of refraction of amorphous silicon (a-Si) and polycrystalline silicon (p-Si), in the wavelength range between about 1.2 and about 1.6 micrometers, differ by up to about 20%, with the amorphous phase having the larger index. Spatially selective laser crystallization of amorphous silicon provides a mechanism for controlling the spatial variation of the refractive index and for surrounding the amorphous regions with crystalline material. In cases where an amorphous silicon film is interposed between layers of low refractive index, for example, a structure comprised of a SiO<sub>2</sub> substrate, a Si film and an SiO<sub>2</sub> film, the formation of guided wave structures is particularly simple.